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Movement of a Biopsy-Site Marker Clip after Completion of Stereotactic Directional Vacuum-assisted Breast Biopsy: Case Report[1]

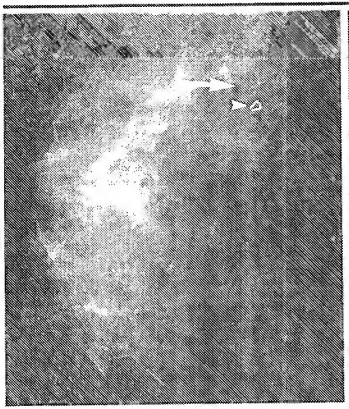
A 51-year-old woman underwent stereotactic core biopsy of suspicious microcalcifications in the upper outer left breast with subsequent metallic clip deployment. Postprocedure mammograms demonstrated accurate placement of the clip. However, mammography 10 months later revealed movement of the clip 4 cm medially in the breast.

A small radiopaque marker, usually a metallic clip, may be placed at the site of stereotactic core biopsy of a breast lesion to precisely localize the biopsy site when the lesion appears to have been completely removed (1–3). This is important to facilitate imaging guidance for a subsequent surgical biopsy of a malignant or high-risk mammographic lesion. However, because there is no need for subsequent excision of a benign lesion, a metallic clip deployed after core biopsy of such a lesion is almost always left in place, presumably anchored at the biopsy site. Other indications for relatively long-term placement of a metallic clip include localizing the tumor bed in a breast cancer patient receiving preoperative chemotherapy (4) and providing mammographic-sonographic correlation during sonographically guided core biopsy of a mammographically detected lesion (5). To date, one published report involving a small consecutive series has described relatively long-term stability in the placement of deployed clips (1). Our case report documents what we believe to be the first reported occurrence of postbiopsy clip movement, in this instance to a different quadrant of the breast, occurring some time within 10 months after clip deployment.

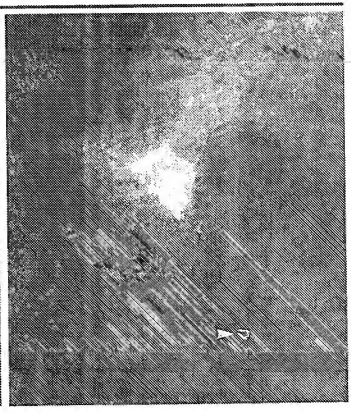
Case Report

A 51-year-old woman underwent stereotactic core biopsy of a small cluster of suspicious microcalcifications in the upper outer quadrant of the left breast. Biopsy was performed from a lateral-to-medial approach with an 11-gauge, directional, vacuum-assisted biopsy instrument (Mammotome; Ethicon Endo-Surgery, Cincinnati, Ohio). Only minimal bleeding was observed as cores were retrieved from the biopsy device. Because radiographs of the cores of tissue indicated that almost all if not all of the targeted microcalcifications had been removed, a metallic clip (MicroMark; Ethicon Endo-Surgery) was deployed through the biopsy probe. Postprocedure mammograms were obtained in craniocaudal (Figure, part a) and 90° lateral projections shortly after core-biopsy breast compression was released. The mammograms demonstrated complete removal of the targeted microcalcifications, placement of the clip within 5 mm of the air-filled biopsy cavity, and absence of a postprocedure hematoma. The patient reported no immediate or intermediate-term complications. Histopathologic analysis of the biopsy cores showed benign breast tissue containing calcifications within benign ducts. Repeat left mammography was recommended in 6 months.

The patient, who was still asymptomatic, returned for mammography 10 months after core biopsy. No new or residual calcifications were seen at the previous biopsy site, and clip location appeared to be unchanged on a 90° lateral projection mammogram. However, on a

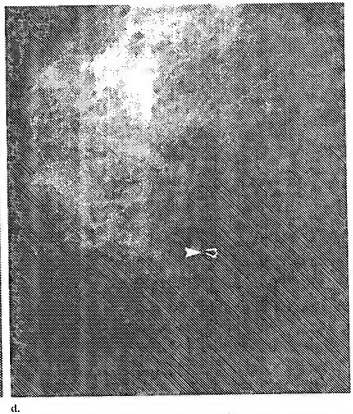


a.



b.

c.



d.

Mammograms obtained in a 51 year old woman who underwent percutaneous core biopsy of clustered microcalcifications and placement of a metallic marker clip in the upper outer left breast. **(a)** Craniocaudal projection mammogram obtained immediately after the procedure demonstrates complete removal of the targeted microcalcifications and placement of the clip (arrowhead) within 5 mm of the air-filled biopsy cavity (arrow) in the lateral portion of the breast. **(b)** Craniocaudal projection mammogram obtained 10 months after the image in a shows that the clip (arrowhead) appears to be located in the medial portion of the breast, 4 cm distant from the core biopsy site. **(c, d)** Craniocaudal projection mammograms with the breast rolled 10° **(c)** medially and **(d)** laterally obtained immediately after the image in b confirm that the clip (arrowhead) has in fact moved to the medial portion of the breast.

craniocaudal projection mammogram, the clip was observed to have moved 4 cm medially (Figure, part b). Additional mammograms were then obtained in the craniocaudal projection with the top of the breast rolled 10° both medially and laterally (Figure, parts c and d). These mammograms demonstrated conclusively that the clip was now located in the medial portion of the breast; it had previously been located in the lateral portion. Clip migration was discussed with the patient and her referring physician, and they decided not to have the clip excised.

Discussion

To our knowledge, there is one published report that documents positional stability among 31 patients undergoing initial follow-up mammography after core biopsy (mean interval after clip placement, 8.6 months) (1). One letter to the editor described the "disappearance" of a metallic clip from the breast after stereotactic core biopsy (6). Radiographs of other parts of the body were not obtained in that case to search for the metallic clip; the assumption was made, based on bleeding at the biopsy site, that the clip had extruded through the skin incision. To our knowledge, our currently reported case is the first to document clip movement occurring in a delayed fashion after an uncomplicated core biopsy procedure and accurate clip deployment.

Since their approval for use by the U.S. Food and Drug Administration in March 1995, approximately 505,000 MicroMark clips have been sold (Shoemaker B, product director for Mammotome, Ethicon Endo-Surgery, written communication, May 2001). Presumably, at least 100,000 of these clips have already been deployed, and many thousands of these have been left to remain within the breast. The frequency of postbiopsy clip movement cannot be estimated at this time, but the lack of other reports of this nature indicate it is probably a rare occurrence.

Several recent reports concerning stereotactic core biopsy have advocated the use of wider-caliber biopsy probes and the acquisition of increased numbers of cores to reduce sampling error and thereby improve the reliability of pathologic interpretation (1,2). However, the acquisition of larger-volume tissue samples increases the likelihood that small lesions will appear to be completely removed, therefore increasing the need for clip placement to guide any subsequent excision.

It should not be surprising that movement of a marker clip might occur in the breast. If a hookwire used for the localization of a nonpalpable breast lesion is transected during surgical biopsy, it may be retained in the breast (7–10). We are aware of an unpublished case documenting the migration of a wire fragment that had been retained in the breast for 14 years to an extramammary site, specifically the parietal pleura (Homer MJ, written communication, February 2001). However, migration of wire fragments is likely to be a rare event. In a series of 10 cases of wire fragments retained in the breast, none migrated over a mean follow-up interval of 4.6 years (range, 1.5–11 years) (11). Kopans reports no cases of migration in his personal experience with a series of patients with retained wire fragments (10). One must distinguish wire migration from the (also rare) situation in which a hookwire is placed too deep in the breast so that it hooks into the pectoral muscle during the localization procedure, thereby causing the wire to be drawn immediately too far into the breast and occasionally into deeper structures, such as the pleura and the supraclavicular fossa (8,12–14).

Our case demonstrates that clip movement may occur after an apparently uncomplicated core biopsy procedure. The mechanism for this movement cannot be determined with certainty in our case, but we propose two possibilities. First, because the core biopsy was performed from a lateral-to-medial approach, a permutation of the "accordion effect" may explain the movement of the clip. The accordion effect describes the markedly inaccurate clip placement that is occasionally apparent immediately after the breast expands to its normal shape after having been compressed during core biopsy; during this expansion, the clip can move substantially away from the site of biopsy along the track of probe insertion (1–3). An immediate accordion effect cannot explain what occurred in our case because the postprocedure craniocaudal-view mammogram documents accurate placement of the clip after core-biopsy compression was released. However, the findings in our case may be the result of a delayed accordion effect. If the 90° lateral, postprocedure mammogram was actually obtained after rather than before the craniocaudal, postprocedure mammogram, the act of compressing the breast in the process of obtaining the 90° lateral mammogram may have resulted in the movement of an insufficiently anchored clip within the biopsy cavity. Unfortunately, the sequence in which the two postprocedure mammograms were obtained was not recorded in our case. Second, simple clip migration may have occurred either within or outside the biopsy cavity, unrelated to postbiopsy breast compression during mammography, at some time in the 10-month interval between the biopsy and the time follow-up mammograms were obtained.

To our knowledge, there are no published reports of clip movement after documentation of accurate placement on postprocedure mammograms. Our case reinforces the value of orthogonal-view mammography immediately following stereotactic core biopsy with clip placement. These postprocedure images not only document the initial accuracy of clip placement (1,2), but also (if obtained in the proper sequence) permit immediate identification of delayed accordion-effect clip movement. We believe the first postbiopsy mammogram should be obtained in the same projection used during core biopsy itself. Thus, if core biopsy were performed in the 90° lateral projection, then the first postbiopsy mammogram should be taken in the 90° lateral projection as well, so that delayed accordion-effect clip movement could be documented immediately on the subsequent craniocaudal view. In our case, which concerns clip movement that was not identified until 10 months after core biopsy, we cannot distinguish between delayed accordion-effect clip movement and true clip migration, because the sequence of postprocedure mammography was neither controlled nor recorded.

If true clip migration does occur, clip removal should be considered. If this option is chosen, the clip can be removed not only with standard wire localization followed by surgical excision, but also less invasively by stereotactically guided, percutaneous extraction through an 11-gauge, directional, vacuum-assisted probe (15,16).

The possibility of clip movement after core biopsy exists. Until the frequency of postbiopsy clip movement is more precisely known, we believe that it is appropriate to describe it as a very rare occurrence.

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